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**E06C 1/393**

(52) UK CL (Edition P)

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(56) Documents Cited

**GB 2042309 A**

**EP 0457703 A1**

**FR 002263369 A1**

**US 4485892 A**

(58) Field of Search

**UK CL (Edition P) A4H, A4L LAAN, E1S SLA1**

**INT CL<sup>6</sup> E06C 1/383 1/39 1/393**

(54) Abstract Title

**Combined step ladder and stool**

(57) A combined step ladder and stool (10) has two pairs of legs (20, 30), pivotally connected together at or adjacent their upper ends (40), and a tread (50) pivotally connected to a first pair of legs (20). The tread (50) is turnable between a stowage position in which it lies generally in or close to a plane defined by the first pair of legs (20), and an erected position in which it spans the first and second pairs of legs (20, 30). The tread (50) carries a latch member (60) pivotally connected thereto so as to be turnable between latching and release positions. When latching, the latch member (60) engages and retains an engagement member (70) of or carried by the second pair of legs (30). In the release position the latch member (60) allows the engagement member (70) to enter the mouth of an open slot in the latch member (60). The engagement member (70) may be a strut joining two legs of a pair, and two latch mechanisms may be provided.

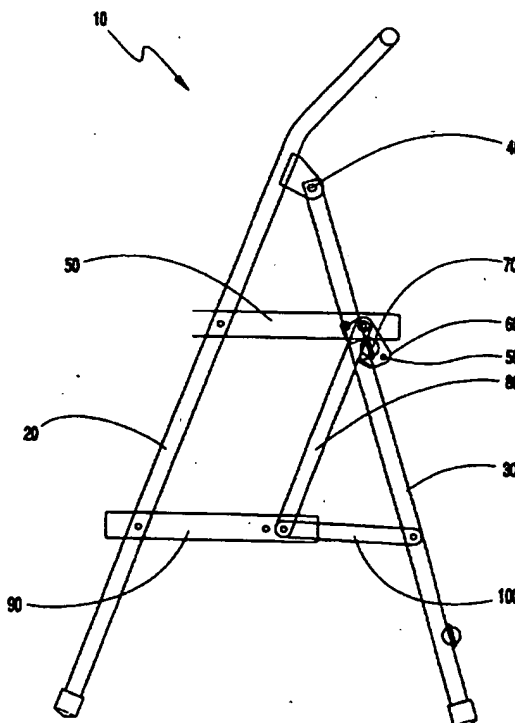


FIG 1

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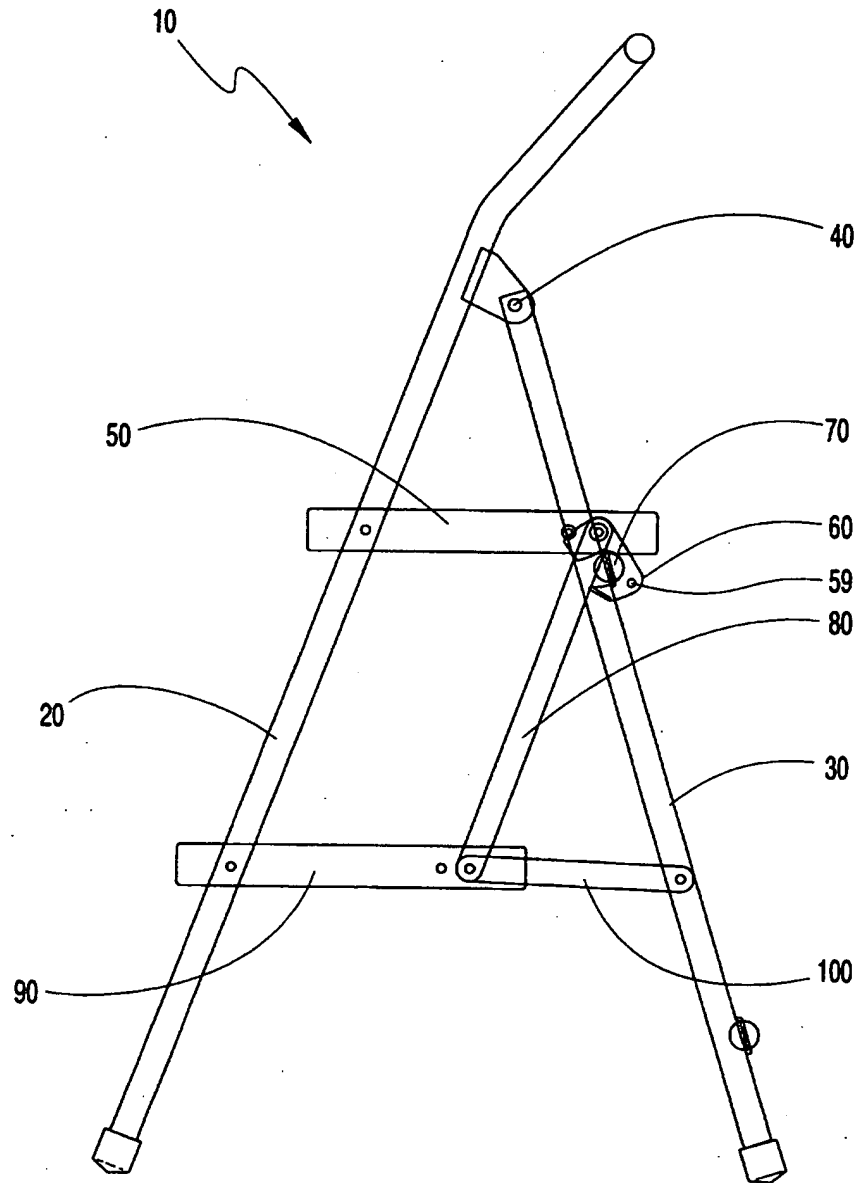


FIG 1

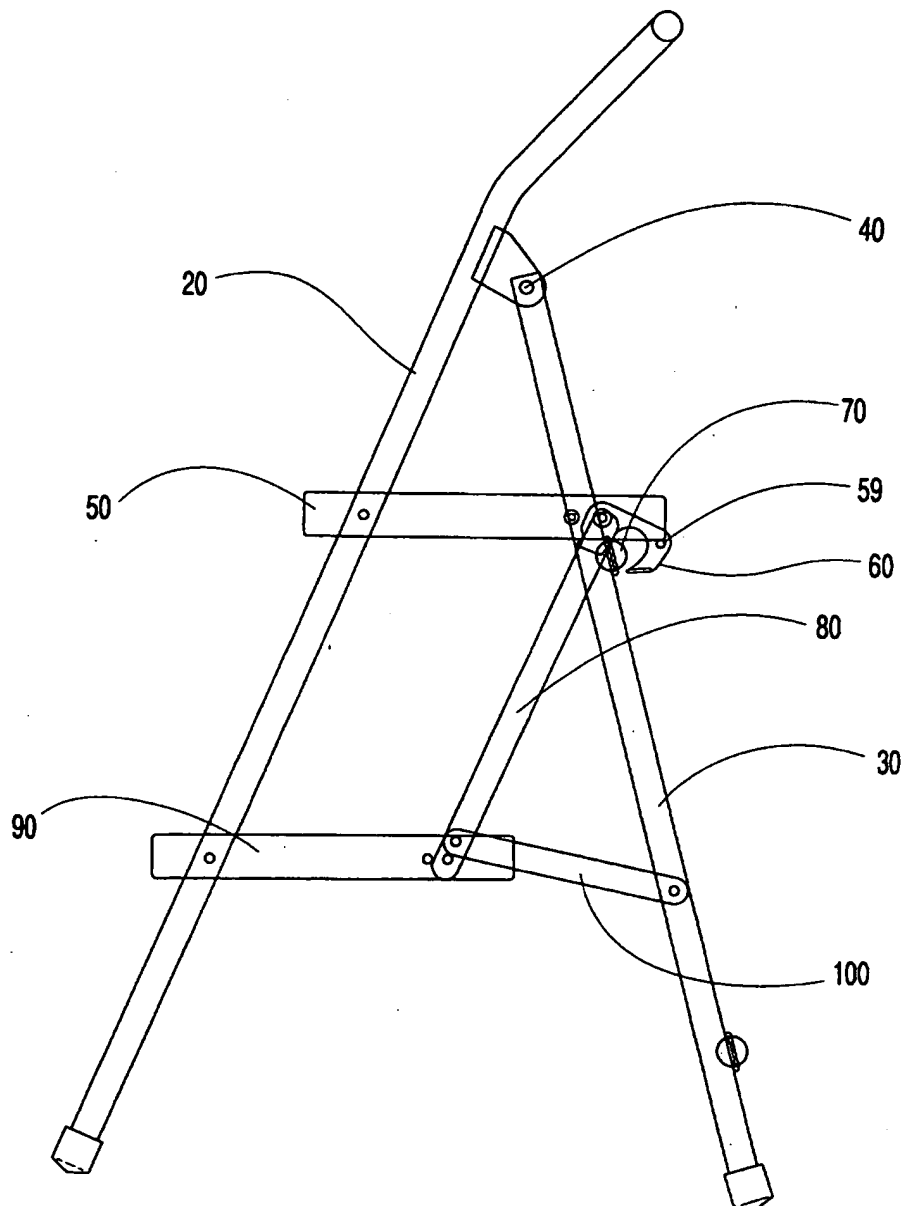


FIG 2

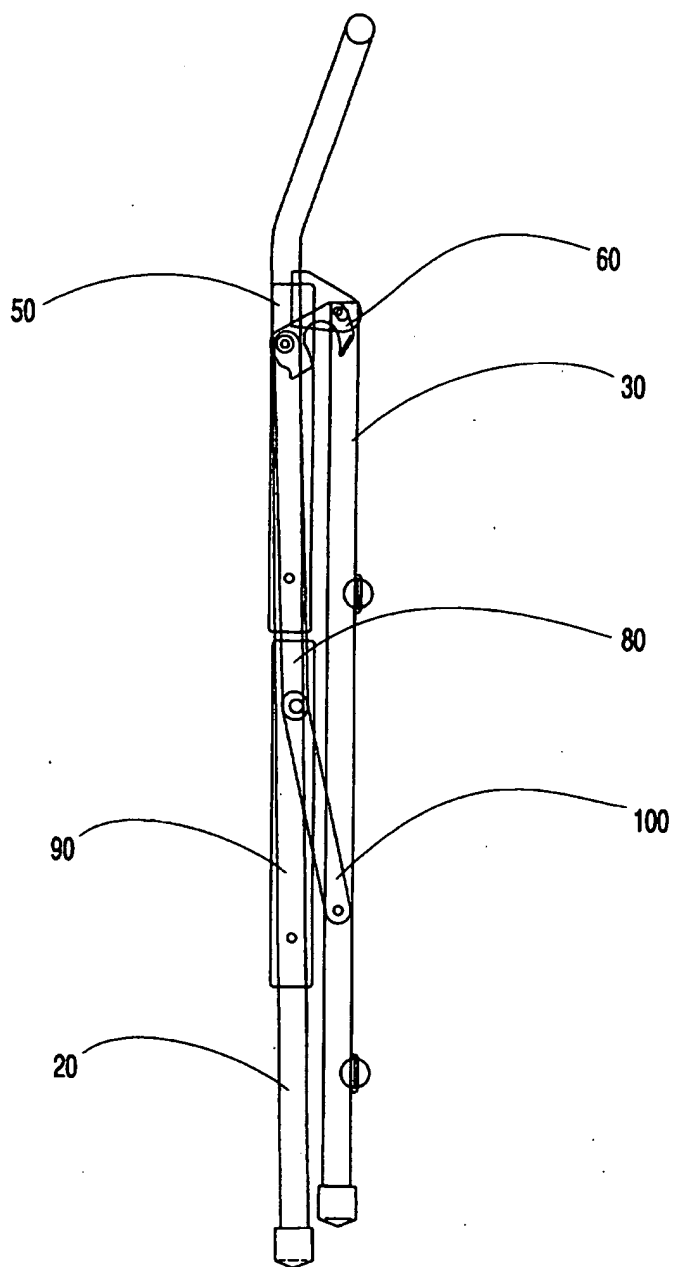


FIG 3

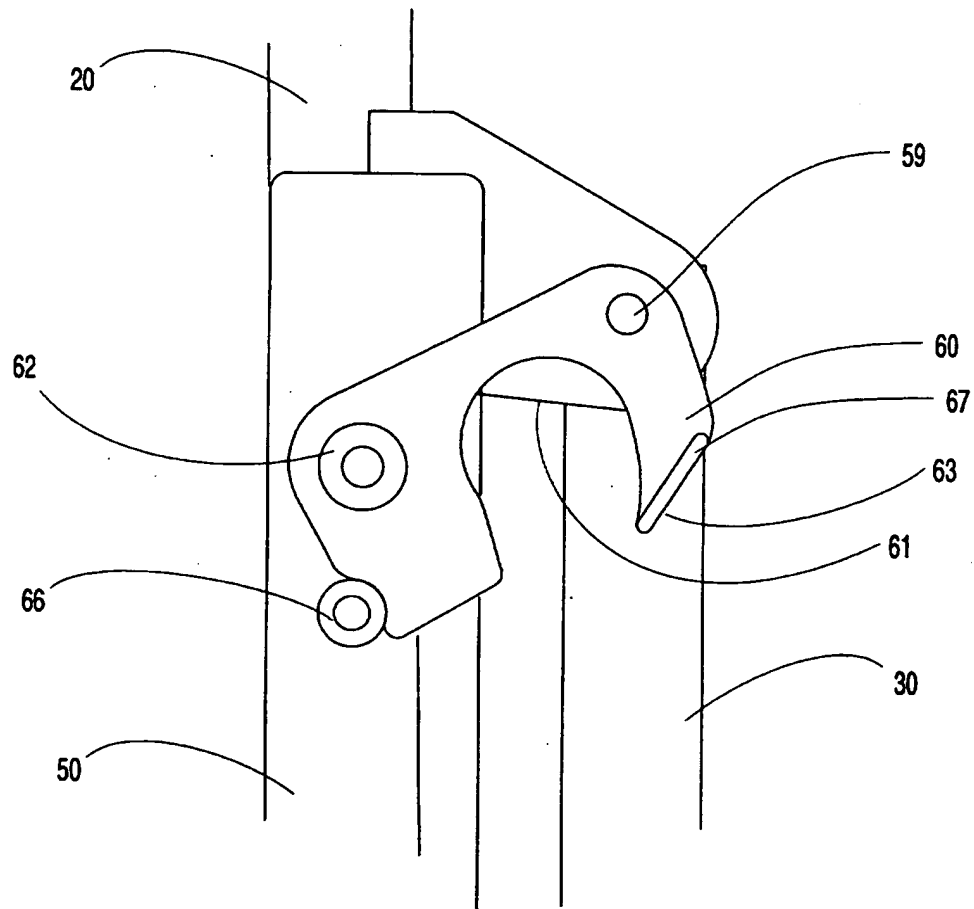
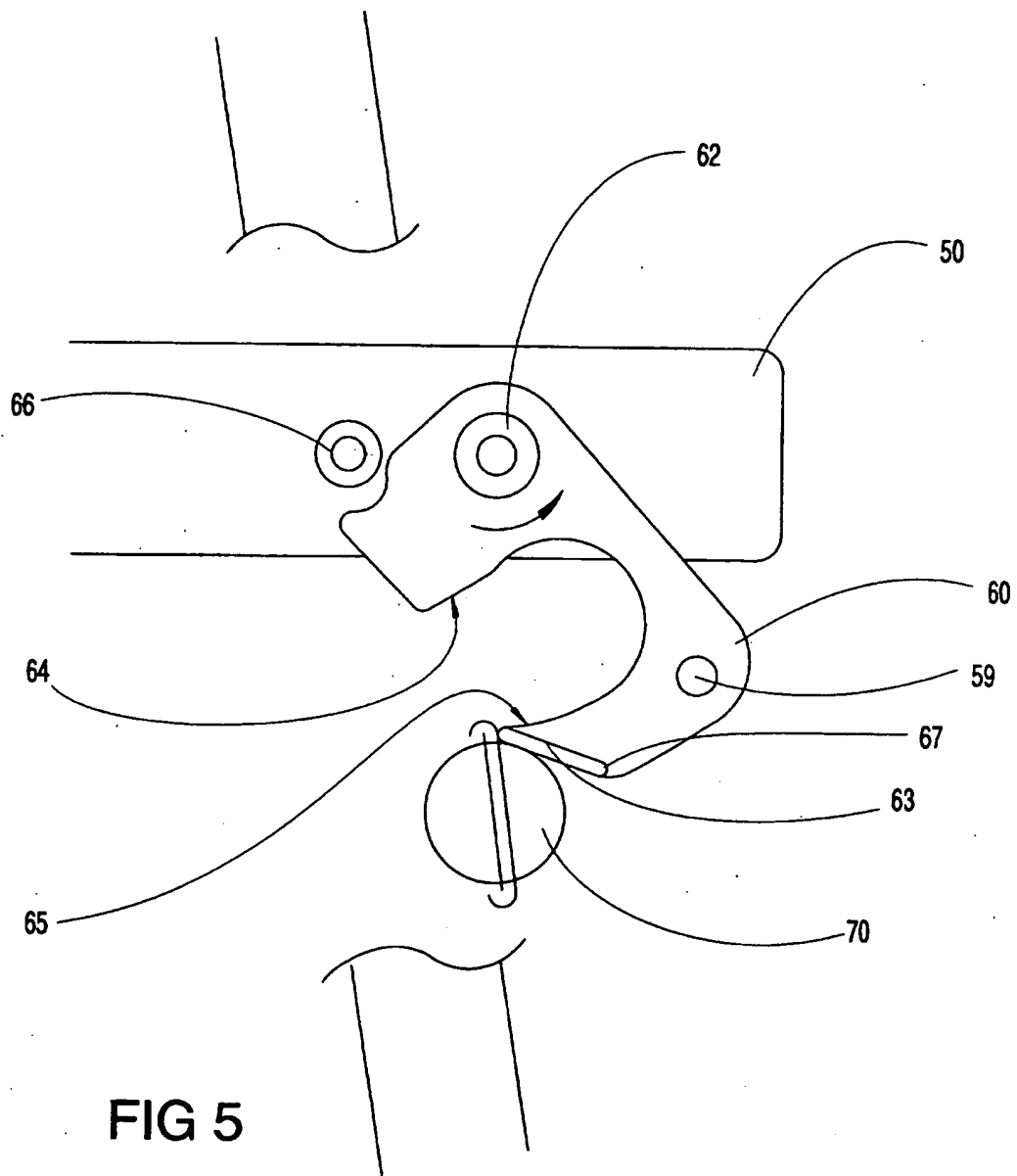


FIG 4



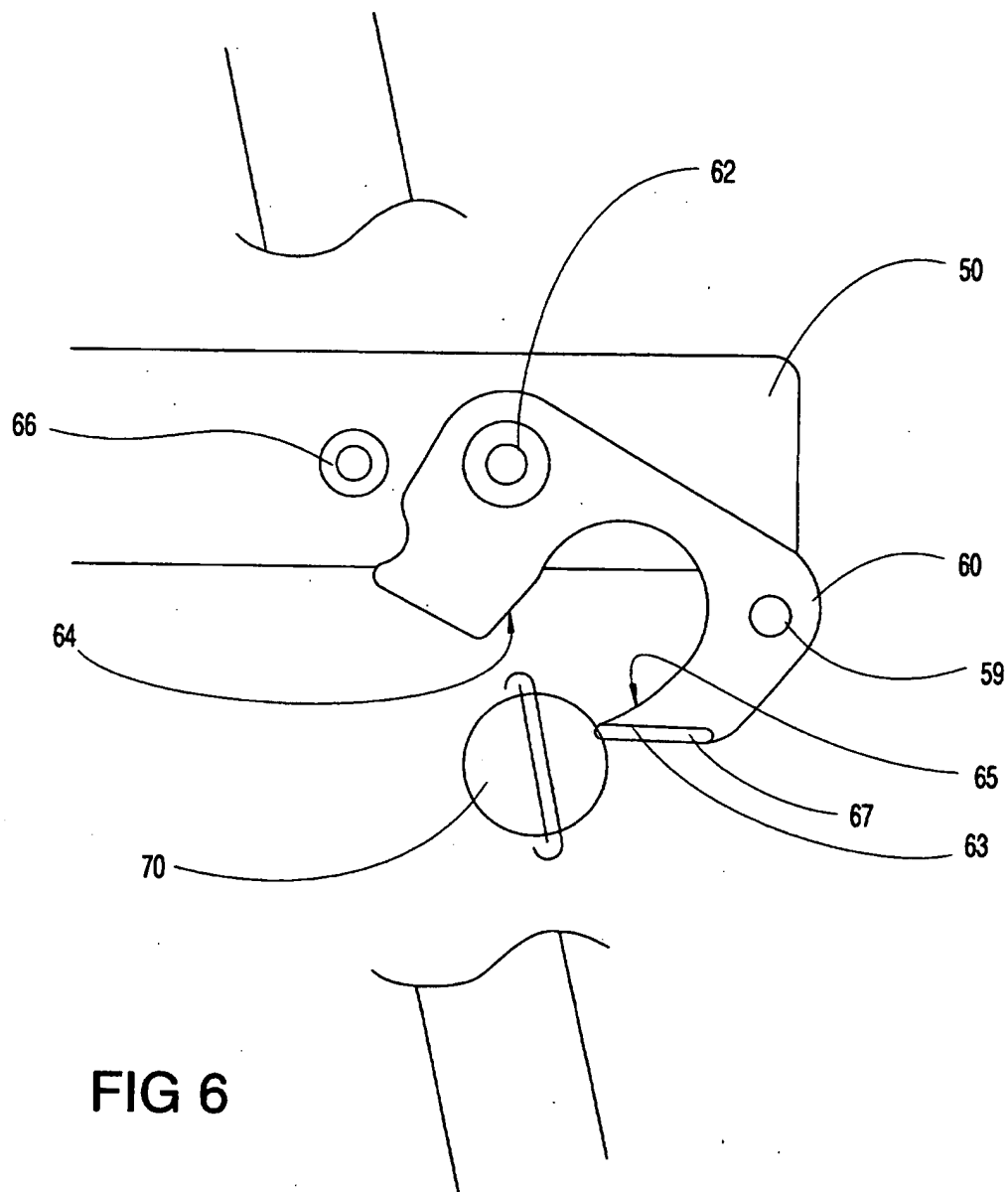


FIG 6

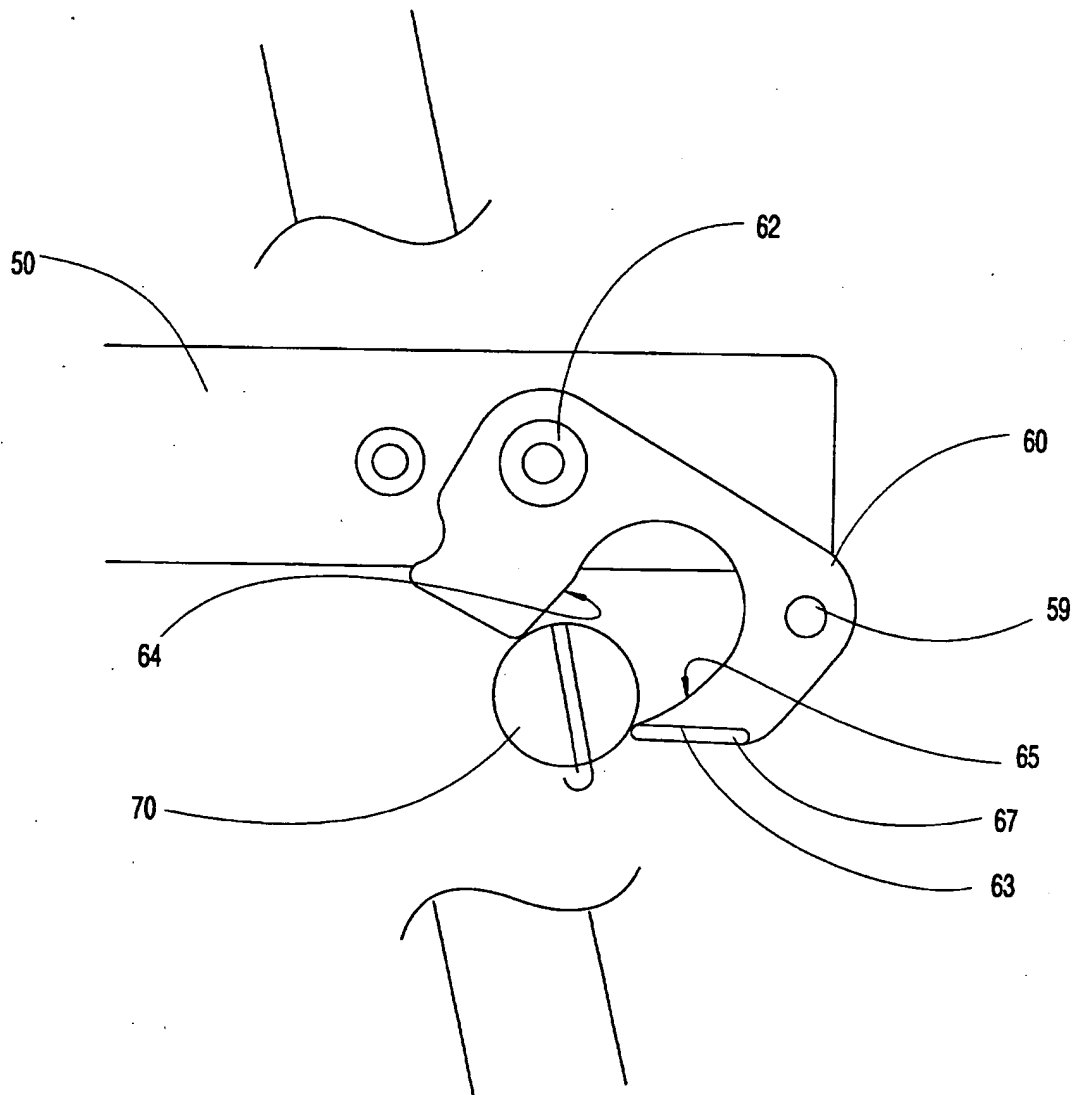


FIG 7



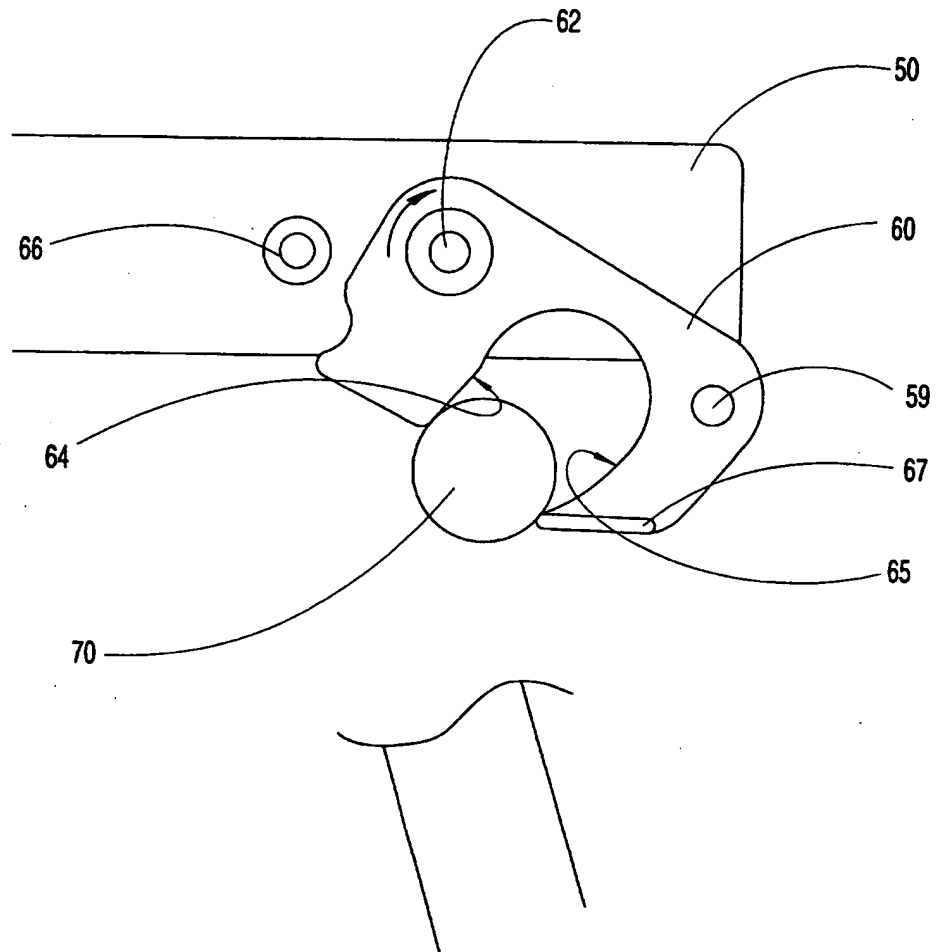


FIG 8

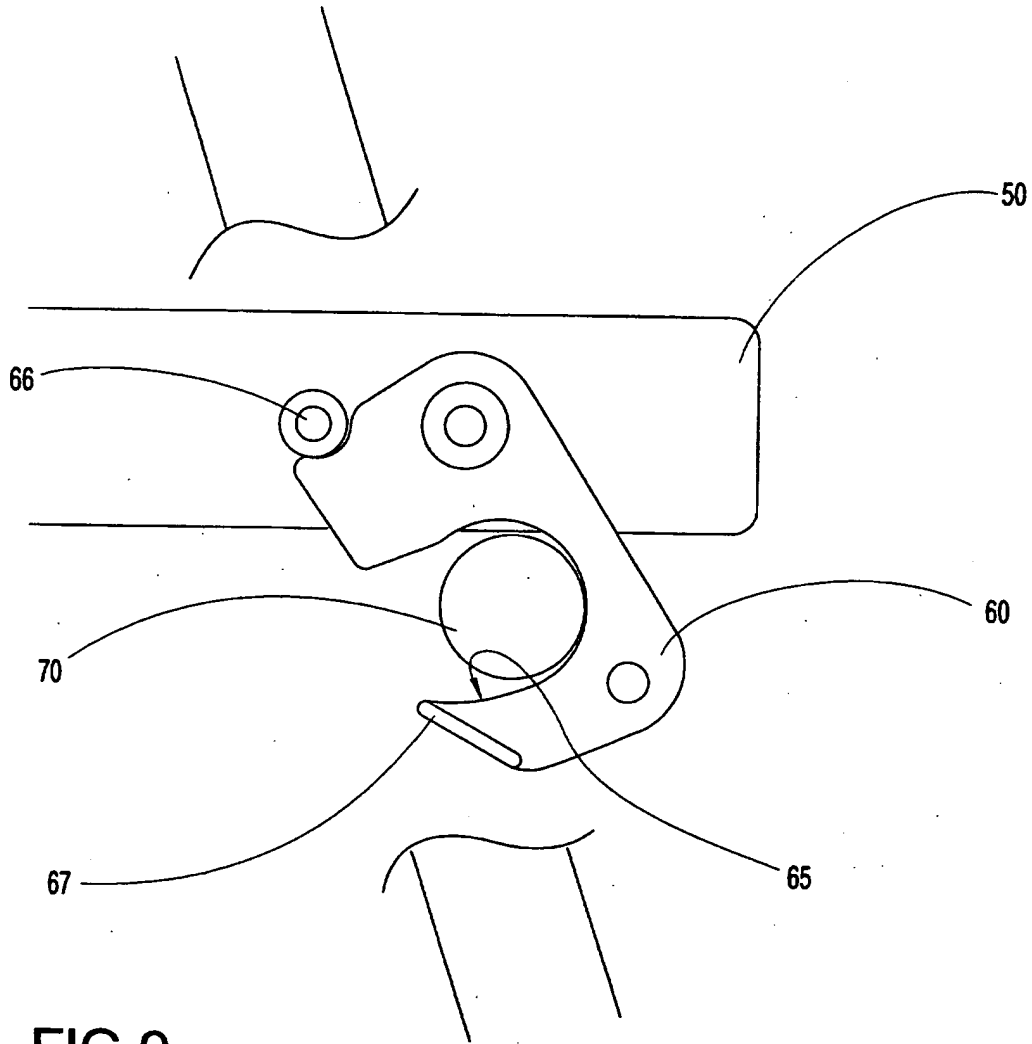


FIG 9

## A COMBINED STEPLADDER AND STOOL

The present invention relates generally to a combined stepladder and stool. Small stepladders having, for example, two or three treads are known in which at least the upper tread is formed to dimensions such that it can form a seat or a load platform, larger than that which is required simply for a user's foot, which may be used for a number of purposes. Typically, a combined stepladder and stool of the type briefly described above is commonly referred to as a step stool and use of this expression hereinafter will be understood to refer to a combined stepladder and stool of the type hereinabove defined.

One known form of step stool comprises two pairs of legs pivotally connected together at or adjacent an upper point so that the two pairs can be turned to a position in which they lie substantially parallel to one another (a so-called stowage position) or can be moved to an erected position in which the two pairs of legs are inclined to one another to form an A-frame in cross-section. Pivotaly connected to one pair of legs is an upper tread or platform with, below it, one or more other treads in a stepladder configuration. A crossbar or other form of rest is provided on the other pair of legs, hereinafter the back legs, so that when the tread or platform is turned to its erected position its free edge, that is the edge remote from that by which it is pivoted

to the front pair of legs, can rest on the crossbar. A folding linkage connects the front and back legs to limit their spread position when open.

5 Although this forms a structure which is generally resistant to the forces exerted by a stationary load acting through the platform, dynamic loads which may be exerted on the tread or platform by a user, particularly when moving about to reach inconvenient places whilst  
10 performing a task standing on the platform, may result in asymmetric forces causing the platform to move and tending to collapse the step stool. Regulations contemplated for setting standards of safety are in the course of development which will require a locking  
15 connection to be made for such step stools so that, once erected, they cannot be collapsed without a deliberate and purposeful unlocking action, and which does not depend on friction or tension.

20 The present invention seeks, therefore, to provide a step stool of the type generally described above in which such a structure is provided which will act automatically to lock the step stool in its erected condition without requiring a separate operation by the user.

25

According to one aspect of the present invention, therefore, there is provided a combined stepladder and stool having two pairs of legs pivotally connected

together at or adjacent upper ends thereof and a tread pivotally connected to a first pair of legs and turnable between a stowage position in which it lies generally in or close to a plane defined by the said first pair of legs, and an erected position in which it extends from the first to the second pair of legs, in which the said tread carries a latch member pivotally connected thereto so as to be turnable between latching and release positions in the former of which the latch member engages and retains an engagement member of or carried by the second pair of legs and in the latter of which it allows the engagement member to pass through the mouth of an open slot in the latch member as the said tread is turned between the said stowage and erected positions.

15

A primary advantage of this invention is that, when the stepladder is in the erected position, the configuration of the latch member is such as to ensure its stability, removing the likelihood of collapse due, for example, to dynamic loads exerted thereon.

20

In one embodiment of the invention, the said open slot has a first flank portion in the mouth so positioned with respect to the pivot about which the latch turns as to cause latch-closing movement of the latch at least over a part of its range of movement when contacted by the said engagement member as the tread is turned from its stowage to its erected position.

25

Erection of the step stool according to the invention therefore requires minimal intervention by the user who simply needs to turn the tread from the stowage to the erected position. It is not necessary separately to move  
5 the latch member into its latching position.

In addition, stop means may be provided for preventing the latch member from turning beyond the said latching position when not engaged by the engagement member. This  
10 is advantageous is ensuring that the latch member is always in the correct position for adopting the latching position when the step stool is next erected.

In an embodiment of the invention the engagement member  
15 may be a strut joining two legs of a pair.

Furthermore, the open slot in the latch member may be provided with a second flank portion, opposite the said first flank portion, the shape of which, in relation to  
20 the relative positions of the pivot which connects the latch to the said tread and the position of the said engagement member, is such that when engaged there is no cam action or turning moment exerted by the engagement member when a force is applied to the tread in a  
25 direction such as to urge it from its erected towards its stowage position such that the latch securely retains the stepladder or stool in its erected position.

One of the major disadvantages associated with the prior art is thus overcome and, in addition, the step stool according to this embodiment of the invention conforms to the contemplated safety standards relating to such stools  
5 and ladders.

The latch member may have a nose portion adjacent the mouth of the said open slot, inclined at an angle such as to act as a cam surface when engaged by the engagement  
10 member whereby to cause the latch member to turn to bring the mouth of the open slot into register with the engagement member as the tread is turned towards the erected position. This is advantageous in minimising the effort required by the user in erecting the step stool,  
15 and further minimises the risk of the user's fingers becoming caught in the latch mechanism.

In one embodiment of the invention, the said tread is provided with two latch members one on each side thereof.  
20 The said two latch members may be joined by a transverse connector rod.

In an embodiment of the invention the latches and/or the connector rod preferably do not project beyond the edge  
25 of the said tread opposite that edge adjacent which the tread is pivotally connected to the said one pair of legs.

In a preferred embodiment of the invention, the said two pairs of legs are joined by a linkage comprising first and second link members pivotally connected together at one end and pivotally connected to a respective pair of legs at respective opposite ends. A third link member pivotally interconnects at least one of the first and second link members to the said tread at or adjacent a said latch member whereby to cause the said two pairs of legs to be drawn together as the said step or tread is turned to its stowage position. One of the said first and second links may be a second tread.

An embodiment of the invention will now be more particularly described, by way of example, with reference to the accompanying drawings, in which:

Figure 1 is a diagrammatic side view of an embodiment of the invention, shown in the erected position;

Figure 2 is a diagrammatic side view of the embodiment of the invention shown in Figure 1, shown in a position just before latching in the completely erected position;

Figure 3 is a diagrammatic side view of the embodiment of the invention of Figure 1, shown in the stowage position;

Figure 4 is an enlarged side view of the latch member of the embodiment of Figures 1, 2 and 3, shown in



the release position with the stepladder stowed;

Figures 5 to 8 are side views of the latch member of the embodiment of Figures 1, 2 and 3, showing it in various positions between the release and latching positions; and

Figure 9 is a side view of the latch member of the embodiment of Figures 1, 2 and 3, shown in the latching position.

10 With reference to the drawings, Figure 1 shows an embodiment of the step stool according to the invention, generally indicated 10, in its fully erected position. The step stool 10 includes two pairs of legs, front 20 and back 30 (only one leg of each pair is shown in the  
15 drawings), pivotally connected together at a pivot 40 located adjacent the upper ends of the front legs 20 and at the upper ends of the back legs 30.

A tread 50 is pivotally connected to the front legs 20  
20 and is turnable between a stowage position in which it lies generally in or close to a plane defined by the front legs 20 (see Figure 3), and an erected position in which it extends between the front legs 20 and back legs 30. The tread 50 carries a latch member 60 at each of  
25 its ends (only one of which is seen in the drawing) pivotally connected thereto so as to be turnable between latching and release positions. The latch members 60 are connected by a transverse connector rod (not visible, but

represented by the circle 59). A crossbar 70 extends between the back legs 30, providing a support for the free edge of the tread 50 when in the erected position.

In this particular embodiment, the crossbar 70 also functions as an engagement member for the latch member 60; this will be described more fully below.

The front 20 and back 30 legs are joined by a linkage comprising first and second link members 90, 100 pivotally connected together at one end and pivotally connected to the front and back legs 20, 30 respectively at respective opposite ends.

A third link member 80 pivotally interconnects the first and second link members 100, 90 to the tread 50 at the same pivot point at which the latch member 60 is pivotally connected to the tread 50 whereby to cause the front and back legs 20, 30 to be drawn together as the tread 50 is turned to its stowage position.

20

In the particular embodiment illustrated, the second link member 90 is a second tread.

Figure 2 shows the step stool 10 in the position just before the latch engages in the erected position, and Figure 3 shows it in the stowage position. When it is wished to store the step stool 10, the user simply has to release the latch members 60 from their engagement

position by lifting the connector rod connecting the latch members 60 and lift the edge of the tread 50 adjacent the back legs 30. Once the latch members 60 have been initially released, the continued upward movement of the tread 50, together with the particular configuration of the latch mechanism, will cause the latch members 60 to disengage completely from the engagement member 70, enabling the step stool 10 to be folded to its stowage position in which the tread 50 lies generally in a plane defined by the said front legs 20 (See Figure 3).

Figures 4 to 9 show the latch member 60 of this embodiment of the invention in different positions between the release position (Figure 4) and the latching position (Figure 9) as the step stool 10 itself is moved from the stowage to the erected position. The working of the latch member 60 will now be described in detail with reference to these drawings.

20

The latch member 60 is generally rectangular in outline with an open slot 61. As mentioned above, the latch member 60 is pivotally connected to the tread 50 at a pivot 62.

25

A nose portion 63 adjacent the mouth of the open slot 61 is shaped so as to act as a cam surface upon engagement with the engagement member 70 (Figure 5) during the

erection of the step stool 10. This causes the latch member 60 to turn (anticlockwise as viewed in the drawings) about the pivot 62, bringing the mouth of the open slot 61 into register with the engagement member 70 (Figure 6). In order to avoid the nose portion 63 scouring the engagement member as it pilots between the release and the latching position, a flange 67 is provided along that edge of the nose portion 63 which comes into contact with the said engagement member 70, thereby providing a smooth contact surface with the engagement member 70.

A first flank portion 64 in the mouth of the open slot 61 is positioned, with respect to the pivot 62 about which the latch member 60 turns, so as to cause a latch-closing movement of the latch member 61, at least over a part of its range of movement, when this first flank 64 comes into contact with the engagement member 70 as the step stool 10 is moved closer towards the fully erected position (see Figures 7 and 8).

By virtue of the particular arrangement of the nose 63 and first flank portion 64, it can be seen that the latch member 60 will, when the tread 50 is moved by the user towards the erected position, automatically engage the engagement member 70, with no additional operation by the user being required.

A second flank portion 65 opposite the first flank portion 64 in the mouth of the open slot 61 is shaped such that, in relation to the relative positions of the pivot 62 and that of the engagement member 70, there is  
5 no cam action or turning moment exerted by the engagement member 70 when a force is applied to the tread 50 to move it in a direction from its erected to its stowage position. The latch member 60 therefore retains the step stool 10 securely in its erected position (Figure 9).

10

As mentioned above, when it is wished to store the step stool 10, the latch members 60 are released simply by lifting the connector bar 59 connecting the two members 60. When in the stowage position, the latch member 60 is  
15 prevented from turning clockwise beyond the latched position by stop means 66 on the tread 50.

The same stop means 66 further prevents the latch member from turning beyond the latching position when the latch  
20 member 60 is not engaged by the engagement member 70.

Figure 4 shows the latch in its released position which is assumed when the step stool 10 is in its stowage position. It should be noted that the latch member 60  
25 and the connector rod 59 do not project beyond the rear edge of the tread 50.

In summary, therefore, the step stool 10 according to the

invention overcomes at least the majority of disadvantages associated with the prior art by providing a latch mechanism which automatically engages to lock the step stool in its erected position simply by erecting the  
5 step stool 10. The user does not have to perform any additional operation to engage the latch. Furthermore, the latch member 60 is shaped such that once engaged, it is held securely in place, thereby avoiding any risk that the step stool 10 may collapse as the result of dynamic  
10 loads exerted thereon by a user.

**CLAIMS**

1. A combined stepladder and stool having two pairs of legs pivotally connected together at or adjacent upper  
5 ends thereof and a tread pivotally connected to a first pair of legs and turnable between a stowage position in which it lies generally in or close to a plane defined by the said first pair of legs, and an erected position in which it spans the first and second pairs of legs, in  
10 which the said tread carries a latch member pivotally connected thereto so as to be turnable between latching and release positions in the former of which the latch member engages and retains an engagement member of or carried by the second pair of legs and in the latter of  
15 which it allows the engagement member to enter the mouth of an open slot in the latch member as the said tread is turned between the said stowage and erected positions.

2. A combined stepladder and stool as claimed in Claim  
20 1, in which the said open slot has a first flank portion in the mouth so positioned with respect to the pivot about which the latch turns as to cause latch-closing movement of the latch at least over a part of its range of movement when contacted by the said engagement member  
25 as the tread is turned from its stowage to its erected position.

3. A combined stepladder and stool as claimed in Claim

2, in which there are further provided stop means for preventing the latch member from turning beyond the said latching position when not engaged by the engagement member.

5

4. A combined stepladder and stool as claimed in Claim 3, in which the said stop means comprise an element contactable by an edge of the latch member.

10 5. A combined stepladder and stool as claimed in any preceding claim, in which the said engagement member is a strut joining two legs of a pair.

6. A combined stepladder and stool as claimed in any  
15 preceding claim, in which the open slot in the latch member has a second flank portion, opposite the said first flank portion, the shape of which is such that, in relation to the relative positions of the pivot which connects the latch to the said tread and the position of  
20 the said engagement member there is no cam action or turning moment exerted by the engagement member when a force is applied to the tread in a direction from its erected to its stowage position such that the latch securely retains the stepladder or stool in its erected  
25 position.

7. A combined stepladder and stool as claimed in any preceding claim, in which the latch member has a nose



portion adjacent the mouth of the said open slot,  
inclined at an angle such as to act as a cam surface when  
engaged by the engagement member whereby to cause the  
latch member to turn to bring the mouth of the open slot  
5 into register with the engagement member as the tread is  
turned towards the erected position.

8. A combined stepladder and stool as claimed in any  
preceding claim, in which the said tread is provided with  
10 two latch members one on each side thereof.

9. A combined stepladder and stool as claimed in Claim  
8, in which the said two latch members are joined by a  
transverse connector rod.

15

10. A combined stepladder and stool as claimed in Claim  
8 or Claim 9, in which the latches and/or the connector  
rod do not project beyond the edge of the said tread  
opposite that edge adjacent which the tread is pivotally  
20 connected to the said one pair of legs.

11. A combined stepladder and stool as claimed in any  
preceding claim, in which the said two pairs of legs are  
joined by a linkage comprising first and second link  
25 members pivotally connected together at one end and  
pivotally connected to a respective pair of legs at  
respective opposite ends.

12. A combined stepladder and stool as claimed in Claim 11, in which a third link member pivotally interconnects at least one of the first and second link members to the said tread at or adjacent a said latch member whereby to  
5 cause the said two pairs of legs to be drawn together as the said step or tread is turned to its stowage position.

13. A combined stepladder and stool as claimed in Claim 11 or Claim 12, in which one of the said first and second  
10 links is a second tread.

14. A combined stepladder and stool as claimed in any of Claims 3 to 13, in which the latch member is formed as a generally C-shape plate and the said stop means comprise  
15 a projecting spigot engageable against an outer edge of one arm of the C-shape plate.

15. A combined step ladder and stool substantially as hereinbefore described with reference to and as shown in  
20 the accompanying drawings.

**Amendments to the claims have been filed as follows**

1. A combined stepladder and stool having two pairs of legs pivotally connected together at or adjacent upper  
5 ends thereof and a tread pivotally connected to a first pair of legs and turnable between a stowage position in which it lies generally in or close to a plane defined by the said first pair of legs, and an erected position in which it spans the first and second pairs of legs, in  
10 which the said tread carries a latch member pivotally connected thereto so as to be turnable between latching and release positions in the former of which the latch member engages and retains an engagement member of or carried by the second pair of legs and in the latter of  
15 which it allows the engagement member to enter the mouth of an open slot in the latch member having a first flank portion in the mouth so positioned with respect to the pivot about which the latch turns as to cause latch-closing movement of the latch at least over a part of its  
20 range of movement when contacted by the said engagement member as the said tread is turned between the said stowage and erected positions.

2. A combined stepladder and stool as claimed in Claim  
25 1, in which there are further provided stop means for preventing the latch member from turning beyond the said latching position when not engaged by the engagement member.

3. A combined stepladder and stool as claimed in Claim 2, in which the said stop means comprise an element contactable by an edge of the latch member.

5 4. A combined stepladder and stool as claimed in any preceding claim, in which the said engagement member is a strut joining two legs of a pair.

5. A combined stepladder and stool as claimed in any  
10 preceding claim, in which the open slot in the latch member has a second flank portion, opposite the said first flank portion, the shape of which is such that, in relation to the relative positions of the pivot which connects the latch to the said tread and the position of  
15 the said engagement member there is no cam action or turning moment exerted by the engagement member when a force is applied to the tread in a direction from its erected to its stowage position such that the latch securely retains the stepladder or stool in its erected  
20 position.

6. A combined stepladder and stool as claimed in any preceding claim, in which the latch member has a nose portion adjacent the mouth of the said open slot,  
25 inclined at an angle such as to act as a cam surface when engaged by the engagement member whereby to cause the latch member to turn to bring the mouth of the open slot into register with the engagement member as the tread is

turned towards the erected position.

7. A combined stepladder and stool as claimed in any preceding claim, in which the said tread is provided with  
5 two latch members one on each side thereof.

8. A combined stepladder and stool as claimed in Claim 7, in which the said two latch members are joined by a transverse connector rod.

10

9. A combined stepladder and stool as claimed in Claim 7 or Claim 8, in which the latches and/or the connector rod do not project beyond the edge of the said tread opposite that edge adjacent which the tread is pivotally  
15 connected to the said one pair of legs.

10. A combined stepladder and stool as claimed in any preceding claim, in which the said two pairs of legs are joined by a linkage comprising first and second link  
20 members pivotally connected together at one end and pivotally connected to a respective pair of legs at respective opposite ends.

11. A combined stepladder and stool as claimed in Claim  
25 10, in which a third link member pivotally interconnects at least one of the first and second link members to the said tread at or adjacent a said latch member whereby to cause the said two pairs of legs to be drawn together as

the said step or tread is turned to its stowage position.

12. A combined stepladder and stool as claimed in Claim  
10 or Claim 11, in which one of the said first and second  
5 links is a second tread.

13. A combined stepladder and stool as claimed in any of  
Claims 2 to 12, in which the latch member is formed as a  
generally C-shape plate and the said stop means comprise  
10 a projecting spigot engageable against an outer edge of  
one arm of the C-shape plate.

14. A combined step ladder and stool substantially as  
hereinbefore described with reference to and as shown in  
15 the accompanying drawings.



Application No: GB 9803392.1  
Claims searched: 1-15

Examiner: B.J. Buchanan  
Date of search: 11 May 1998

**Patents Act 1977**  
**Search Report under Section 17**

**Databases searched:**

UK Patent Office collections, including GB, EP, WO & US patent specifications, in:

UK Cl (Ed.P): E1S: SLA1, A4H, A4L

Int Cl (Ed.6): E06C

Other: Online WPI

**Documents considered to be relevant:**

Category	Identity of document and relevant passage	Relevant to claims
A	GB2042039 Inventec Patents Limited (See esp. Fig. 7 & Page 2 lines 67 - 82)	
A	EP0457703A1 Vuilleminot, Bertrand (See esp. abstract and Figs. 1 & 4)	
A	US4485892 Maloney & Schroer (See esp. Figs. 1 - 5 & 7, & Col. 3 line 66 - Col. 4 line 61)	
A	FR2263369 A1 Ducros, Georges Emile (See esp. Figs. 1&2)	

X Document indicating lack of novelty or inventive step  
Y Document indicating lack of inventive step if combined with one or more other documents of same category.  
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P Document published on or after the declared priority date but before the filing date of this invention.  
E Patent document published on or after, but with priority date earlier than, the filing date of this application.